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Summary of the Locust Work for the 1st Quarter, 1916.

By F. W. South.

When the year opened the position of the work appeared to be very favourable. There were only comparatively few flying swarms in the Federated Malay States and the hopper season there had just finished. In Johore there were a few swarms of hoppers around Batu Anam and a considerable number of flying swarms in various parts of the country, though most of them were between Sungei Mati and Tangkak and around Tangkak itself. At the end of March, however, a large number of swarms of hoppers were found in the Tampin District and much destruction work will be necessary there during the coming quarter. Hoppers also developed in considerable number in Johore.

Staff Changes.

With a prospect of considerable reduction of the Locust work in the Federated Malay States, it was decided, on the suggestion of the Director of Agriculture to reduce the European Staff and to place the work under the immediate supervision of the Assistant Agricultural Inspectors in Selangor and the Negri Sembilan. To assist them it was arranged that selected conductors, one in each district, should be given an additional allowance during the periods of hopper destruction and should have additional responsibility for the proper conduct of the work in their respective districts. Consequently Mr. O'Brien's services in the Tampin district were dispensed with at the end of February, and Mr. Tollemache in the Coast District was informed that his services would not be required after the end of April.

During the quarter negotiations were proceeding between the the Governments of the Federated Malay States and of the Straits Settlements which resulted in the locust work in Malacca being placed in charge of this Department. As a result of this the Chief Agricultural Inspector and Mr. Lyford visited Malacca from March 14th to March 18th to ascertain what work was to be expected and on March 23rd Mr. Lyford was transferred from Selangor to Malacca where he took up his residence at Jasin and commenced destruction work at once. All the necessary apparatus was ordered and delivered as fast as possible.

Selangor.

At the commencement of the year there were three swarms of fliers present in the State, located as follows:—

1. One which had come over from the Negri Sembilan at Semenyih.

2. A second swarm that came from Broga and also went to Semenyih.

3. A large swarm near the Kuchai Road.

These were all kept under observation. Swarms (1) and (2) remained in Semenyih until the beginning of February when they joined up to form a large swarm which went over to Broga on February 15th and remained between Broga and Lenggeng until the end of March.

The 3rd swarm moved about considerably and was twice lost sight of, from January 9th to January 17th and then again until the 26th, having been at Batu Caves and Bungsa on the two latter dates. It travelled to various places, but eventually settled again on the Kuchai Road at the end of the quarter. It was reported to have copulated in March 3rd but even up to the end of April no breeding had taken place.

Another swarm was reported at Rawang in February and afterwards at Kanching, Ulu Klang and Cheras. This may have been a part of the Kuchai swarm which became separated when the original swarm came up to Batu Caves.

The fact that no breeding has taken place is very remarkable and is not easy to understand, as it would not appear that the swarms were lost sight of for long enough to allow new flying swarms to develop in out of the way places, which is one possible explanation. Furthermore, had any new swarms been hatched out they would certainly have been larger and more numerous than

their parent swarms. It would seem that for some reason the breeding of these swarms has been delayed or has possibly failed entirely.

NEGRI SEMBILAN.

In this State there was no destruction work until about March 20th when hoppers appeared in the Tampin District.

Seremban District. During the first two months of the quarter there were three flying swarms to the north east of the town. In February, however, they totally disappeared and careful scouting work failed to reveal any trace of them. Either they died out in the jungle among the hills towards Kuala Pilah and Perhentian Tinggi or else they made their way down into the Tampin District and Malacca. During March the district was entirely free from locusts. After Mr. Lyford's departure for Malacca a conductor was left to watch for any swarms which might re-enter from the South.

Coast District. There were no locusts in any stage found in this district throughout the quarter. The Special Assistant and his Conductors were engaged in watching one or two swarms of fliers known to be beyond the Linggi River in Malacca, but none came over into the district. This is the first time the district has been entirely free from locusts since they first made their appearance.

Tampin District. Until the end of March only from 10 to 12 flying swarms were reported by the Scouts and Conductors as being present in this district, but at the end of the month hoppers appeared in quick succession in may parts. One swarm of 3rd instar hoppers was discovered on the 23rd at Selaru 7 miles from Kuala Pilah. Swarms of very young hoppers were numerous around Ayer Kuning and Chimpul Estate and along the Railway line to Batang Malacca with others from Keru Station out to Pondoi. There were breeding grounds at Yeu and on Repeh Estate and more were expected as flying swarms were present in various places. In fact all the evidence pointed to the presence in the near future of a very large generation of hoppers.

This large generation of hoppers was quite unexpected. The scouting work must have been somewhat defective during February and the early part of March, but in addition to this allowance must be made for the entry of a certain number of flying swarms from Malacca and Johore at the end of March which either laid eggs immediately after their arrival, or were about to do so at the end of the quarter. The nature of the district renders it easy for

swarms to come in without being observed and several which entered at the end of March undoubtedly were overlooked.

Malacca.

From the end of January onwards it became probable that the control of the locust work in the Territory might be placed in the hands of this Department and steps were taken to form some opinion of what hoppers might be expected, as fliers only present throughout the month of February. The Forest Ranger was in temporary charge of the work from February 1st to March 14th when Mr. Lyford took charge. Scouting was carried on vigorously during February and the results of this revealed only a limited number of flying swarms, so no very large generation of hoppers was expected.

Early in March the first swarm of hoppers hatched out at the 20th mile on the Jasin-Chin Chin Road and work was commenced on the 7th. On the 14th, the Chief Agricultural Inspector and Mr. Lyford arrived and brought down additional apparatus with which another two gangs were started on the 18th. The Mandors formerly engaged on the work were retained and additional supplies of apparatus were ordered and sent from Kuala Lumpur for use as they were prepared. Hoppers was reported at Chebau on the 24th and also between the 18th and the 21st miles on the Kesang-Selandâr Road.

By the end of the month 5 gangs of coolies were at work in the following places; at the 25th and 26th miles near Chabau, at the 18th and 21st miles on the Kesang-Salandar Road and at the 20½ mile on the turning to Chin Chin. Other hoppers were located at the 23rd, 23½ and 24th miles on the Chabau Road at the 17th, 18th and 20th miles on the Machap Road and 2 miles in from Gadek Railway Station. These were not being worked for the lack of apparatus, though its delivery was expected within a few days. It was evident that the generation of hoppers was larger than was expected at first and that much work would be necessary.

In addition to the difficulties to be met in providing apparatus rapidly under conditions for which it was difficult to estimate the quantity necessary, there were difficulties to be overcome in obtaining labour at a reasonable figure owing to the high prices offered by owners of kampongs for tappers, prices which they could well afford with rubber at over 3 shillings per pound.

At the end of the quarter, however, the work had made a good start. It had been decided to use the bag trap method only, as the

use of poison was considered too dangerous, at any rate in most places in Malacca on account of the large number of bullocks and buffaloes in the country.

The unexpected number of swarms of hoppers in proportion to the number of flying swarms previously known may be accounted for by the entry of flying swarms from Johore during March, but it is also possible both in Malacca and in the Tampin District that some swarms were hatched from breeding grounds in which the eggs had been lying dormant for 6 months or perhaps longer. No definite statement on this subject can, however, be made.

JOHORE.

At the beginning of January a few swarms remained to be destroyed at Batu Anam, but elsewhere there were no hoppers until the end of February when they appeared again near Sungei Mati. During March destruction work was in full progress between Sungei Mati and Tangkak and around Tangkak. At the end of the month hoppers also appeared at Grisek and between there and the back of Nordanal Estate.

Batu Anam. The destruction of hoppers was concluded on January 7th and 21 swarms were poisoned making a total of 145 swarms destroyed during the season December 1st to January 7th. Subsequently the flying swarms were kept under observation. In February only 3 swarms were known and during March no locusts were found. In January a trip was made by one of the Mandors to Ulu Palong and the Pahang borders to find out if any locusts had been seen there. None had been observed in that neighbourhood.

Panchor, Muar River. The Mandor was ill in January and sent in no report: in February two flying swarms were reported, one of which left without laying eggs, while the other laid at Grisek and behind Nordanal Estate. These eggs hatched out towards the end of March, but destruction work did not commence until April 1st owing to lack of sufficient sprayers, a deficiency which was remedied by that date. An attempt to drive the 1st instar hoppers near Grisek proved useless. Most of the hoppers were in heavy lalang.

Sungei Mati. In January there were several flying swarms in this district, they moved about very actively and in consequence it was difficult to find breeding grounds. Two were located, one at Penkalan Besar and one at the 12th mile Tangkak Road. In February a big fire destroyed the eggs at Penkalan Besar, but at the end of the month hoppers appeared at the 10th and 12th miles on the Tangkak Road and eggs were laid at Serom by a swarm

which arrived there on the 13th. On March 7th work began between the 9th and 12th miles on the Tangkak Road. It had been delayed by the difficulty of getting labour which difficulty was increased by the fear of tigers in the country 1 or 2 miles in from the road where the hoppers were. Towards the end of the month the gang moved to Serom, as the hoppers there were in the 4th instar. They completed the work there and returned to the Tangkak Road where they were still at work when the quarter ended. Labour has been very difficult to obtain in this district and has had to be transported some distance every day.

Tangkak. During January and February there were numerous flying swarms moving about actively in this district. Several of these were small. In February two breeding grounds were found one ½ mile and the other 1 mile from Tangkak. Destruction work was commenced on March 7th and hoppers kept appearing throughout the month. There was a large number of small swarms scattered about the district, especially at Chenas on the Malacca boundary.

When work commenced the driving method was first used as the hoppers were in padi land and bullocks were numerous. This proved slow, however, and the Malays asked that poison should be used in order to save their padi which was about to be harvested. They promised to keep their bullocks tied up until the poisoning was done. The Magistrate at Tangkak then made an announcement in the Mosque on the subject of tying up cattle and after this poison was put down. The Malays were most careful and only one bullock was killed, as it broke its rope in the night and escaped. The owner made no complaint. The hoppers near the padi were all destroyed towards the end of the month and the gang then moved to Padang Lalang.

Conclusion.

In general the work is progressing satisfactorily, though in Tampin and Malacca there are more hoppers by far than were expected. The destruction work in all three States, Negri Sembilan, Malacca and Johore will continue at least until the end of April.

Table of Results of the Locust Work for the First Quarter, 1916.

District.	Locality.	Dates.	Swarms Driven.	Tins.	Swarms poisoned.	Total swarms	
Tampin	Keru	March 20—31	—	—	42	42	
	Ayer Kuning	March 22—31	—	—	30	30	
	Selaru	March 25 –31	—	—	15	15	
	Batang Malacca	March 30 & 31	—	—	3	3	
					90	90	Total Tampin
Malacca.	20th and 21½ miles ChinChin Road. 25th and 26th miles Chabau. 18th mile Kesang. 21st mile Selandar	March 24—31	39	—	—	39	
			39			39	Total Malacca. 39
Johore.	Batu Anam	January 1—7	—	—	21	21	
	Tangkak	March 7—31	12	45½	19	31	
	Sungei Mati	March 7—31	—	—	30	30	
			12	45½	70	82	Total Johore. 82
							Grand Total 211

Soils of the Sabak District on the Bernam River.

By J. Grantham.

Considerable development has been taking place in this district during the last 2 or 3 years and is still proceeding, large areas being opened up for coconuts. The area dealt with in this paper is situated on the left bank of the Bernam River (the Selangor side) and comprises all the land between Utan Melintang and Kampong Toh Khalifa a distance of some 30 miles by river though much less by land. From Utan Melintang to Sabak the greater portion has been opened up with coconuts during the last 2 or 3 years. Beyond Sabak the land is mainly virgin jungle with the exception of one coconut estate and the kampongs.

The soils of this district are all of the heavy clay type, of alluvial origin and show no essential differences from the clays of the better known coast districts of Klang and Kuala Langat, though perhaps on the whole slightly heavier in texture. This heaviness is offset to some extent by a fair percentage of organic matter. The clay varies from about 20% to over 40%, the higher percentage preponderating. The soils are characterised by being unusually rich in potash and nitrogen; the phosphate although somewhat low is above the average for the country. All the soils are as usual acid, but not excessively so. Occasionally patches of peat are found, generally in hollows some little distance from the river. These patches are objectionable as their low level renders drainage difficult if not impossible. Drainage of the higher clay lands can apparently be carried out quite satisfactorily.

The analyses given below were obtained from soils collected during two visits to the district. Nos. 1, 2, 3, 4, 5, 6 and 7 are from estates opened up along the river frontage between the bend opposite Utan Melintang and Sabak. On all of these the coconuts are doing moderately well, No. 7 being decidedly the best. This too is a soil on which the Sarawak bean grows very well as a cover crop. Sweet potatoes are grown as cover crops on most of these soils.

No. 8 is soil from jungle at the back of No. 7. A slightly heavier textured soil than No. 7 though less so than Nos. 1 to 6.

No. 9 is from a native holding at Sabak yielding 60-70 nuts per tree per annum.

No. 10 is from jungle in the Government Reserve further up river at Sungei Sapintas.

No. 11 and 12 are from an estate adjoining the block from which No. 10 was obtained.

No. 13 is from jungle 1 mile inland from just above Kampong Khalifa.

MECHANICAL ANALYSES.

	1	2	3	4	5	6	7
Coarse sand	.2	.2	.2	.2	.1	.1	.2
Fine sand	.7	.2	.1	.2	.6	.8	2.2
Coarse silt	10.3	2.9	2.1	7.2	4.9	6.5	21.3
Fine silt	30.3	32.2	38.9	35.1	34.9	34.9	30.4
Clay	36.2	44.0	37.8	38.2	40.8	40.4	19.7
Moisture	6.6	6.7	6.0	6.6	5.9	6.1	6.1
Loss on ignition ..	13.3	11.8	13.4	10.6	10.9	10.7	20.1
Lost during analysis	2.3	2.0	1.5	1.9	1.9	.5	—
	100	100	100	100	100	100	100

	8	9	10	11	12	13
Coarse sand	.1	—	.7	.3		.2
Fine sand	1.2	1.3	3.3	.9		7.4
Coarse silt	16.5	10.0	11.4	3.9		16.5
Fine silt	29.7	36.8	39.5	35.4	Peat	21.0
Clay	29.8	33.6	26.1	40.2		28.0
Moisture	7.3	3.0	4.6	5.5		6.3
Loss on ignition	13.3	15.3	11.3	12.4	11.2	17.2
Lost during analysis ..	2.1	—	3.1	1.4	61.6	3.4
	100	100	100	100	—	100

CHEMICAL ANALYSES.

	1	2	3	4	5	6	7
Insolube in hydrochloric acid percent	63	61	62	70	65	65	61
Potash total „	.654	.856	.735	.605	.700	.740	.500
Phosphate „ „	.114	.097	.095	.081	.121	.078	.131
Nitrogen „	.371	.322	.350	.301	.343	.322	.482
Lime absorption „	.124	.288	.170	.123	.093	.106	.386

	8	9	10	11	12	13
Insoluble in hydrochloric acid percent	63	—	69	65	20	63
Potash total „	.646	.512	.605	.645	.203	.560
Phosphate „ „	.085	.063	.181	.118	.160	.097
Nitrogen „	.272	.245	.302	.263	.174	.342
Lime absorption „	.159	.136	.094	.234	.627	.327

On examination of these figures the outstanding feature is the almost entire absence of the sand fractions and the preponderence of the very fine fractions. It is generally considered and has been borne out by analyses of most other soils on which coconuts are cultivated in this country that a fair proportion of sand is essential to a good coconut soil. The growth exhibited on the Bernam estates (though none of them are yet in bearing) would seem to rather modify this view as undoubtedly good growth is taking place on heavy soils. It is however on the lighter soil such as No. 7, that the best results are being obtained, and it must also be remembered that these soils with few exceptions are rich in humus and nitrogen, which considerably modifies their texture. The maintenance of this soil humus by the use of green manures should be practised on these soils. Although there is practically no rubber in this area except in kampongs, there is little doubt that with efficient drainage it would prove an excellent soil for rubber and probably better than it is for coconuts.

Rubber adulterated with starch.

By B. J. Eaton.

A peculiar specimen of rubber was received in May from the Hon: Secretary of the Johore Planters' Association, which consisted of a thin sheet resembling a piece of drab coloured leather or hide. The rubber was easily torn and had a pure white interior, resembling flour. On examination the sample was found to contain a large quantity of starch, which was found to be probably tapioca starch. It was found impossible to estimate the starch by washing it out on a crepeing machine, since the rubber refused to cohere on crepeing and became a mass of crumbs, the particles being washed through the sieves below the crepeing machine and lost. By boiling the rubber however in dilute Hydrochloric acid and subsequently in pure water and by crepeing it on a small experimental

crepeing machine with hot water, a fairly coherent sample was obtained, which could be subsequently creped and washed with cold water on the ordinary factory crepeing machine and converted into thin crepe on a factory sheeting machine. Even after this treatment the rubber resembled lace and was very weak. The loss on treatment, which probably consisted almost entirely of starch, was 50.9 per cent.

The writer had been informed previously that starch, in the form of tapioca or sago, which is easily obtainable locally, was probably used by contractors' tapping coolies on estates where contract tapping exists. The managers of such estates pay on the wet weight of rubber collected, making an allowance for the water content of the sheet rubber obtained, the sheets being weighed sometime after being machined and hung to drain. If starch be used as an adulterant, it absorbs a large proportion of water and the manager pays not only for the added starch but for water, since the wet sheets, on drying, lose much more weight, than would normally be allowed for. The sample received is however the first in which starch has been discovered, although two suspected samples from another estate were received some time ago and no starch found.

The history of the present sample however does not indicate whether the adulteration was practised for the reason suggested above, or whether it is an actual case of adulteration by the owner of the estate and vendor of the rubber. The sample in question was taken from the middle of a parcel of rubber from Johore consigned to Singapore and sold at the auctions there, the vendor being a Chinese. The large amount of starch left in the dry rubber would suggest that the adulterant was added deliberately for selling purposes.

This note is inserted to warn planters who may be employing contract tappers to look out for adulteration of this nature.

It would probably be easily detected in sheet rubber when dry, but not in crepe, since the starch would probably be almost entirely removed on the crepeing machine, when fresh coagulum is washed. A very simple test for identifying the presence of starch, although not the origin of such starch, is to add a few drops of a dilute solution of iodine to the suspected sample of rubber or latex, when a blue colour will be produced.

Bacterised Peat.

The letters published below appear in Science Progress for April 1916. In view of the wide publicity given to Bacterised peat

in the daily press of the Middle East, the matter is considered to be of sufficient importance to bring before the notice of all cultivators. Suggestions have been made that this material should be given a trial in tropical countries, but in view of these letters, a waiting policy is advisable, until the experiments in progress at Rothamsted and elsewhere are concluded.

I. From Sir Sydney Olivier, K.C.M.G., B.A., L.L.D.

Sir,—We are a little perplexed by the reference in the current issue of Science Progress to the relations of the Board of Agriculture and Fisheries with Prof. Bottomley, which appears to us quite inappropriate to the facts of the case; and as misapprehension on this subject is somewhat general, I should like to give you the facts.

For the last two years we have been giving King's College a grant in support of Prof. Bottomley's investigations on bacterised peat, and have been following his experiments with great interest. Facilities for some of these experiments were also granted at Kew, which, as you know, is under the Board's control. In the autumn of last year Prof. Bottomley, in a public lecture, announced that the Board had refused to take advantage of his offer to waive his patent rights and this statement formed the subject of comment in the Press at the time. As a matter of fact, no formal offer had been made to the Board nor, if it had been made, could we have accepted it, in view of Prof. Bottomley's admission that no experiments on a commercial scale had been carried out successfully—and, I may add, of the doubts that many of his scientific colleagues still entertain as to the value of his discovery. We have now made arrangements with Dr. Russell of Rothamsted to conduct a careful investigation on the whole subject, and if his report is favourable we shall then consider whether any use can be made of Prof. Bottomley's offer. I think you will agree that it would be impracticable for a Government Department to encourage the sale of a substance as to the merits of which considerable doubt existed; that there is still room for doubt whether bacterised peat can be used agriculturally on a commercial scale is sufficiently evident from the report on the experiments at Wisley which appears in the current number of the Journal of the Royal Horticultural Society.

Yours very truly
Sydney Olivier.

Board of Agriculture and Fisheries,
4, Whitehall Place,
January 31st, 1916.

II. From Prof. T. B. Wood and Prof. R. H. Biffen.

Sir,—In the last issue of Science Progress, No. 39, January 1916, page 489, under the heading of "Economy," the writer of "Notes," referring to Prof. Bottomley's bacterised peat, states that its discovery "has made it possible to double the production of our food supply," and then proceeds to criticise the Board of Agriculture for not "availing itself of this well-timed boon." Any discovery which is capable of doubling the production of food deserves serious consideration at the present time, and we therefore hope that you will insert in Science Progress the following remarks on the possibility that such an achievement has been realised.

In claiming for bacterial peat that it is capable of doubling the production of food, we take it that the author of "Notes" means that its use will double the yield per acre of the staple of the farm. Yet we can only find the scantiest evidence to indicate that any attempt has been made to find out whether bacterised peat is of any practical use under farming conditions. This evidence is contained in Chapter XIV of "The Spirit of the Soil" (by G. D. Knox, published by Constable), and, lest any doubt should be thrown on its accuracy, it should be noted that this is vouched for in the foreword written by Prof. Bottomley himself.

Turning now to this evidence, we find that bacterised peat has been tried on four important farm crops; barley, potatoes, mangolds, and wheat. The trials on barley are described as "very promising." They consisted of laboratory tests only, and the facts emphasised are that the treated plants were more deeply coloured, and tillered more freely, than the controls. If these results hold in the field, the use of bacterised peat may confidently be expected to ruin the barley crop, for high nitrogen content as indicated by the deep green colour, and the uneven ripening caused by abundant tillering, are the last features a practical man wishes to see in his barley.

The Experiments with potatoes have the advantage that they were made in the open field, but on land which had not been under cultivation for nine years. The yields from plots treated with bacterised peat are compared with those from plots treated with farmyard manure and with artificial manures, and with the yield from the untreated soil. Bacterised peat is credited with having produced large increases, but it is quite impossible to form any judgment of the value of the results, as all details as to size or number of plots, or quantities of manures, are ignored.

In an appendix, however, a more detailed account is given, apparently of this experiment, from which it appears that the results recorded were obtained by weighing the produce of single plots each of about $\frac{1}{200}$ acre. The dressing of bacterised peat was 9 oz. per square yard, which is approximately 1¼ tons per acre, the cost of which is consequently about £12 per acre. The appendix also records under the headings "Results of which less exact details are available" that the produce of a row of marigolds 9 yards long was increased by 50 per cent. by treatment with an unspecified amount of bacterised peat.

The trials with wheat are still more inconclusive. They were made on market garden soil, obviously unsuited for the purpose, for even the control plots were so badly "lodged" that harvesting was impossible. The one fact they appear to establish is that the use of bacterised peat resulted in a highly undesirable increase of growth in straw and foliage.

Further study of this chapter and the appendix leaves little doubt that if more conclusive evidence of the benefits which bacterised peat can confer on the farmer had been available it would not have been omitted. Yet on this inconceivably flimsy foundation, statements are made that our food supply can be doubled by the use of bacterised peat! We may be pardoned for expressing our doubts whether such statements are justified, especially in view of the fact that in trials carried out near Cambridge with marigolds, wheat, and barley, bacterised peat has failed to produce any increase whatever in the yield.

Further, it must be pointed out that the farmer farms for profit, and that increased yields may be purchased at a cost which may be altogether prohibitive. The price of bacterised peat appears to be about £10 per ton. It has given its best results in pots when mixed with the soil at the rate of 10 per cent. An acre of soil 9 inches deep weighs over 1,000 tons. To reproduce on the farm the conditions which have proved successful in pots would therefore cost about £1,000 per acre. To add even so small a proportion as 1 per cent. to the soil would cost £100 per acre. The value of a good crop of wheat is about £10 per acre in normal times, at present it is seldom more than £15. But the farmer is advised to use only 5 to 10 cwt. per acre, *i.e.* 0.025 to 0.05 per cent. of the weight of his top soil, at the cost of £2-10*s* to £5. per acre, without a shred of evidence to show that such proportions may be expected to produce in his fields results comparable with those obtained by the use of 10 per cent. in a flower pot.

In view of these considerations we submit that the strictures on the Board of Agriculture indulged in by the writer of "Notes" are quite uncalled for, especially as the Board has "availed itself of the well-timed boon" to the extent of arranging for a complete official examination of bacterised peat and its effects on farm crops at the Rothamsted Experimental Station.

Finally there is another side to the question to which we cannot refrain from referring. The popular press continually reminds us that the farmer is the least progressive of mortals and the last to avail himself of the results of modern research. This imputation is infinitely less true than most people realise. In many cases the farmer's caution—for it does not amount to more than that—is justified by his experience. He has in the past been all too willing to accept statements made in a form which appeals to him as "scientific," and his faith has too often been badly abused. Many farmers of our acquaintance, for example, expended considerable sums on nitrobacterine, a former much advertised "discovery" made by Prof. Bottomley. They now heartily endorse the statement on page 156 of The Spirit of the Soil that "from the standpoint of the practical man nitrobacterine was a failure." Such experiences are not readily forgotten. Every repetition of them makes the farmer more and more reluctant to adopt the results of research. This in itself is a severe handicap to the efforts now being made by a considerable body of scientific men throughout the country to improve the position of British Agriculture, for the farmer does not possess the means of distinguishing between results which have been thoroughly established by conscientious trials and much advertised "discoveries" whose practical bearing on crop production rests on no surer foundation than a few haphazard trials carried out under unsuitable conditions by experimenters who do not possess sufficient acquaintance with farming to enable them to interpret the meaning of their own results. For this reason we feel compelled to protest when a periodical of the standing of Science Progress lends itself to the publication of a statement that an untried discovery has made it possible to double the production of food in the country.

T. B. Wood.
R. H. Biffen.

School of Agriculture, Cambridge,
February 28th, 1916.

P. S. (March 8th).—The latest report of the Field Trials of the Midland Agricultural and Dairy Institute shows that dressings of 7 cwt. per acre applied to wheat and seeds hay "produced no result in either crop." In a trial with potatoes the results were:

	Tons.	cwts.	lbs.
No artificial manure	8.	4.	32.
„ „ „ + "humogen"	7.	13.	64.
Standard artificials	12.	17.	16.

T. B. W. and R. H. B.

The Note referred to was inserted during the Editor's absence, the statements in it being based entirely upon statements made at a lecture delivered at the Royal Botanic Society on October 18, 1915, by Prof. W. B. Bottomley, as reported in the Times on the following day.—Secretary (Science Progress).

Comparative Returns of Imports, F. M. S. during the years 1915 and 1914.

Articles	How counted.	Selangor.		Perak.		Negri Sembilan.		Pahang.		1915 Total.		1914 Total.	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
			$		$		$		$		$		$
Coconuts	Pikuls	...	...	...	6,979	...	9	...	50	...	7,038	...	21,135
Copra	,,	...	...	$2\frac{7}{10}$	26	...	...	...	...	$2\frac{7}{10}$	26	397	3,515
Coffee	,,	26	725	$913\frac{1}{2}$	23,572	129	3,044	$221\frac{1}{2}$	7,166	1,290	34,507	$954\frac{1}{2}$	28,030
Padi	,,	$12,574\frac{1}{2}$	36,261	23,470	61,390	$2,010\frac{1}{2}$	5,984	2,622	7,547	40,677	111,182	$99,076\frac{1}{2}$	246,528
Rice	,,	1,330,524	6,389,591	1,382,525	6,544,806	316,507	1,533,995	97,188	498,009	3,126,744	14,966,401	3,380,787	16,689,774
Pepper	,,	$540\frac{3}{4}$	12,647	$240\frac{1}{2}$	7,003	66	2,502	...	...	$847\frac{1}{2}$	22,152	$889\frac{1}{2}$	22,323
Sugar	,,	$57,863\frac{19}{100}$	459,802	$118,347\frac{7}{20}$	1,007,008	18,983	125,826	6,482	60,985	$201,675\frac{31}{75}$	1,653,621	$227,325\frac{1}{4}$	1,429,904
Tapioca	,,	$2,257\frac{1}{2}$	9,661	4,160	70,032	$426\frac{1}{2}$	4,572	6	44	6,850	84,309	7,922	72,390
Gambier	,,	$163\frac{3}{4}$	2,239	$444\frac{1}{5}$	8,173	154	1,209	108	1,498	$869\frac{19}{20}$	13,119	$823\frac{1}{4}$	10,792

Comparative Returns of Exports, F. M. S., during the years 1915 and 1914.

Articles	How counted	Selangor.		Perak.		Negri Sembilan.		Pahang.		1915 Total.		1914 Total	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
			$		$		$		$		$		$
Coconuts	Pikuls	...	2,583	...	69	...	...	...	155	...	2,807	...	2,395
Copra	,,	46,489½	365,763	184,066	1,444,177	1,447	11,497	2,148½	17,071	234,151	1,838,508	243,588¾	2,437,248
Coffee	,,	8,101½⅒	215,231	207	3,943	...	...	...	..	8,308½⅒	219,174	9,319⅞⅒	320,881
Padi	,,	57½	115	89,461	182,953	11	33	...	...	89,529½	183,101	112,174	238,932
Rice	,,	...	...	193,045	864,323	...	...	...	...	193,045	864,323	174,850	783,675
Pepper	,,	43	808	...	...	49	991	145	2,949	237	4,748	328½	6,060
Sugar	,,	...	964	13½	343	...	...	...	...	13½	1,307	121	904
Tapioca	,,	...	...	7,073	25,575	17,235	104,008	17,124	94,131	41,432	223,714	44,747	189,510
Gambier	,,	491	3,264	...	...	11,438	125,768	...	...	11,929	129,032	9,438½	75,668

Exports of Rubber from British Malaya, (other than the F. M. S.)

State.	Month.	Quantity.
Johore	April, 1916.	lbs. 1,845,664
Kelantan	April, 1916.	lbs. 153,348
Kedah	April, 1916.	lbs. 497,707
Perlis	April, 1916.	lbs. 121
British N. Borneo	April, 1916.	lbs. 349,555
Brunei	April, 1916.	lbs. 25,288

FEDERATED MALAY STATES.

Comparative Statement of Cultivated Rubber Exported, with Value and Duty Collected Thereon, During the Years 1916 and 1915.

Destination.	Exported during May, 1916.	Previously.	Total export during the year.	Export during similar period of previous year.	Increase.	Decrease.	Value of rubber exported, 1916.	Duty collected, 1916, to date
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	$	$ c.
Straits Settlements	3,080.26	12,644.59	15,724.85	10,406.23	5,318.62	...	46,004,185	
United Kingdom ...	586.46	4,811.76	5,398.22	5,016.24	381.98	...	15,911,848	
Continent of Europe	...	...	...	5.00	...	5.00	...	
Ceylon	31.93	306.34	338.27	264.81	73.46	...	989,406	
Other Countries ...	257.31	259.07	516.38	95.07	421.31	...	1,406,866	
Total ...	3,955.96	18,021.76	21,977.72	15,787.35	6,195.37	5.00	64,312,305	1,673,715-18

KUALA LUMPUR,
6th June 1916.

E. BURNSIDE,
Acting Commissioner, Trade and Customs, F.M.S.

Abstract of Meteorological Readings in the various Districts of Malaya for the month of April, 1916.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	TEMPERATURE.				HYGROMETER.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Kota Bahru ...	...	144.0	82.5	90.66	74.05	16.61	77.0	.820	73.3	73.	...	4.96	1.68
Pahang, Kuala Lipis ...	...	...	82.5	90.8	73.8	17.0	76.7	...	...	...	...	9.65	1.58
Johore; Johore Bahru ...	...	...	...	88.67	73.70	14.97	...	...	...	...	...	12.38	...
Singapore, Kandang Kerbau	29.783	161.0	83.9	89.0	75.0	14.0	78.6	.915	...	81.	...	3.06	0.82
Malacca, Durian Daun ...	29.736	151.	82.8	88.7	71.8	16.9	79.2	.950	...	85.	S.	9.95	2.05
Negri Sembilan, Seremban	...	152.5	80.6	90.1	70.9	19.2	76.0	.822	73.2	80.2	N.W.	12.98	2.06
,, Kuala Pilah ...	...	146.0	81.7	90.1	73.7	16.4	78.0	.895	75.7	82.6	...	10.27	3.77
,, Port Dickson	...	127.3	82.3	87.9	74.1	13.8	77.9	.873	75.1	79.6	...	19.30	2.16
Selangor, Kuala Lumpur ...	29.805	144.4	81.9	88.4	75.3	13.1	77.3	.849	74.5	78.5	S.E	14.40	2.13
,, Klang ...	...	...	81.6	86.5	74.4	12.1	77.3	...	...	...	...	10.94	2.91
,, Kuala Selangor ...	...	..	...	90.0	75.1	14.9	...	...	...	...	...	4.17	1.24
,, Rawang ...	...	...	...	92.7	...	...	...	...	...	...	...	12.39	2.51
Perak, Telok Anson ...	...	...	82.04	94.	71.	23.	77.85	.898	...	83.	...	6.50	1.16
,, Ipoh ...	...	...	82.81	95.	71.	24.	77.68	.879	74.94	79.	...	9.54	3.19
,, Taiping ...	...	...	81.81	93.	74.	19.	78.02	.911	...	85.	...	22.35	3.88
,, The Cottage ...	...	...	...	...	...	...	...	...	...	...	...	18.11	2.75
,, Parit Buntar ...	...	...	83.08	92.	72.	20.	78.31	.906	...	81.	...	6.84	1.82
Penang, Georgetown ...	29.783	144.5	83.9	90.3	74.3	16.	78.3	.895	76.	74.	N.	7.73	1.65
Kedah, Alor Star ...	...	...	...	...	...	...	...	...	...	...	...	9.70	2.94
Perlis, Perlis ...	...	...	...	90.60	74.20	16.40	...	...	...	...	...	11.60	...